DEC STD 140-3 Documentation Requirements for Backplanes (54- and 70-Class)

DOCUMENT IDENTIFIER: A-DS-EL00140-03-0000 Rev C, 27-Sep-1991

ABSTRACT: This section of DEC STD 140 describes the documentation structure required to define, document, and control engineering backplane design information. DEC STD 140-0 Documentation, Data, and Release Requirements for Printed-Wiring Boards, Modules, and Backplanes — Introduction provides an introduction and the general requirements for this standard.

APPLICABILITY: The documentation content requirements defined in this standard are mandatory for all 70-class/option backplanes released by Digital.

STATUS: APPROVED 27-Sep-1991; use VTX SMC for current status.

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1 PURPOSE

This section of DEC STD 140 defines the structure and describes the contents of the backplane documentation package required for the release of backplane designs to manufacturing. It lists and describes the types of engineering documents required for both assembly-level and printed-wiring board (PWB) design information.

2 SCOPE

The requirements stated in this standard apply to all 50/54- and 70-class backplanes designed and/or manufactured by Digital. This standard describes the different backplane structures manufactured at Digital and the minimum requirements to define each of these structures. Detailed requirements for other drawings required in the backplane documentation package are referenced where applicable. Refer to *DEC STD 013 Standard Engineering Drawing Formats and Forms* (all sections) for drawing size and format requirements.

3 RESPONSIBILITIES

Engineering, Manufacturing, and support organizations are responsible for fully understanding and implementing backplane documentation requirements.

3.1 RESPONSIBLE PRODUCT ENGINEER

The responsible product engineer, as defined on the Chief Engineer's Option/Module List, is responsible for ensuring that the documentation and data for backplanes meets the requirements of DEC STD 140. He or she may use technical services groups to accomplish this.

The responsible product engineer shall also ensure that vendors under contract to design backplanes for Digital comply with the requirements of this standard.

3.2 KANATA ENGINEERING SERVICES AND DEC STD 140 COMMITTEE

Kanata Engineering Services and the DEC STD 140 Committee are responsible for the technical content of this standard. For all comments or requests for changes, contact Kanata Engineering Services, KAO 1/F7, DTN: 621-2803.

4 DEFINITION

A backplane is an assembly that provides interconnections between two or more plug-in modular devices.

The module plug-in capability is provided through use of a variety of connectors such as DEC block, press pin, and surface mount. The connections between these connector blocks and other input-output points are made by using etch, wirewrap, bussing and other types of hand wiring and connection techniques.

A backpanel is an unassembled PWB used in most backplanes. *DEC STD 030-7 Module Manufacturing Standard - Backplane Rules and Related Factors* provides additional details about backpanels and backplanes.

5 TYPES OF BACKPLANES

There are three backplane configurations used to define documentation requirements and are representative of the various forms of backplanes manufactured at Digital; each has unique documentation and interconnection requirements. The three configurations are:

1. Standard bussed and wired backplane
2. PWB backplane
3. Multi-assembly backplane

Backplane documentation requirements are designed for high-volume applications; therefore, this standard does not apply to multi-wire backplanes or other techniques that are limited to prototypes and design engineering supervised build activity. The other backplane configurations are described in the following subheads.

5.1 STANDARD BUSSED AND WIRED BACKPLANE

A standard bussed and wired backplane:

a. Has no etch

b. Uses only standard DEC blocks, with or without support hardware

c. Uses wirewrap techniques and bussing bars for most of its interconnections

This is the earliest version of backplane in use at Digital. It was easy to use with automatic wirewrap techniques, due to the standard molded connector block ensuring connection pin locations on a standard 0.125-inch staggered grid. *Bussed and wired backplanes are not recommended for new designs.*

5.2 PRINTED-WIRING BOARD BACKPLANE

The PWB backplane uses one or more PWBs for most or all interconnections. Various types of connectors are used such as DEC block, press pin, and surface mount. The connector may or may not use wirewrap or cables.

5.3 MULTI-ASSEMBLY BACKPLANE

A multi-assembly backplane uses a combination of different backplane assemblies and/or one or more of another type of subassembly (such as a mechanical assembly) as part of its finished physical configuration.

6 REQUIREMENTS

If discrete components or integrated circuits are assembled (with connectors) on the backplane, 54-class documentation is required. Refer to *DEC STD 140-2 Documentation Requirements for 54-Class Modules and Backplanes*. Backplane assemblies without discrete components or integrated circuits require 70-class documentation only.

6.1 STRUCTURE OF DOCUMENTATION PACKAGES

The structure and minimum content requirements for backplane documentation packages are summarized as follows:

- Standard wirewrap backplane — see Table 1
- PWB backplane — see Table 2
- Multi-assembly backplane — see Figure 1

Additional documentation can be included when required by the responsible engineer and/or manufacturing site.

The following mnemonics and inventory class codes, found in *DEC STD 012-2 Unified Numbering Codes for Part Identifier Class Codes*, are used in this document:

DD	Drawing Directory	AD	Assembly Drawing
IA	Inseparable Assembly Drawing	KPL	Parts List
CS	Circuit Schematic Drawing	MD	Circuit Drill and Etch Mechanical Detail Drawing
UA	Unit Assembly	PC	Design Data
WL	Wire List	OD	Outline Drawing

Table 1: Standard Bussed and Wired Backplane Documentation

70-class	DD
	AD, IA, or UA
	KPL
	CS
	PC

Table 2: Printed-Wiring Board Backplane (Single Board) Documentation

70-class	DD
	AD, IA, or UA
	KPL
	CS
	PC
	MD
	OD[1]
54-class (if required by manufacturing)	DD[1]
	UA[1]
	CS[1]
	KPL[1]
	PC[1]

[1]See DEC STD 140-2

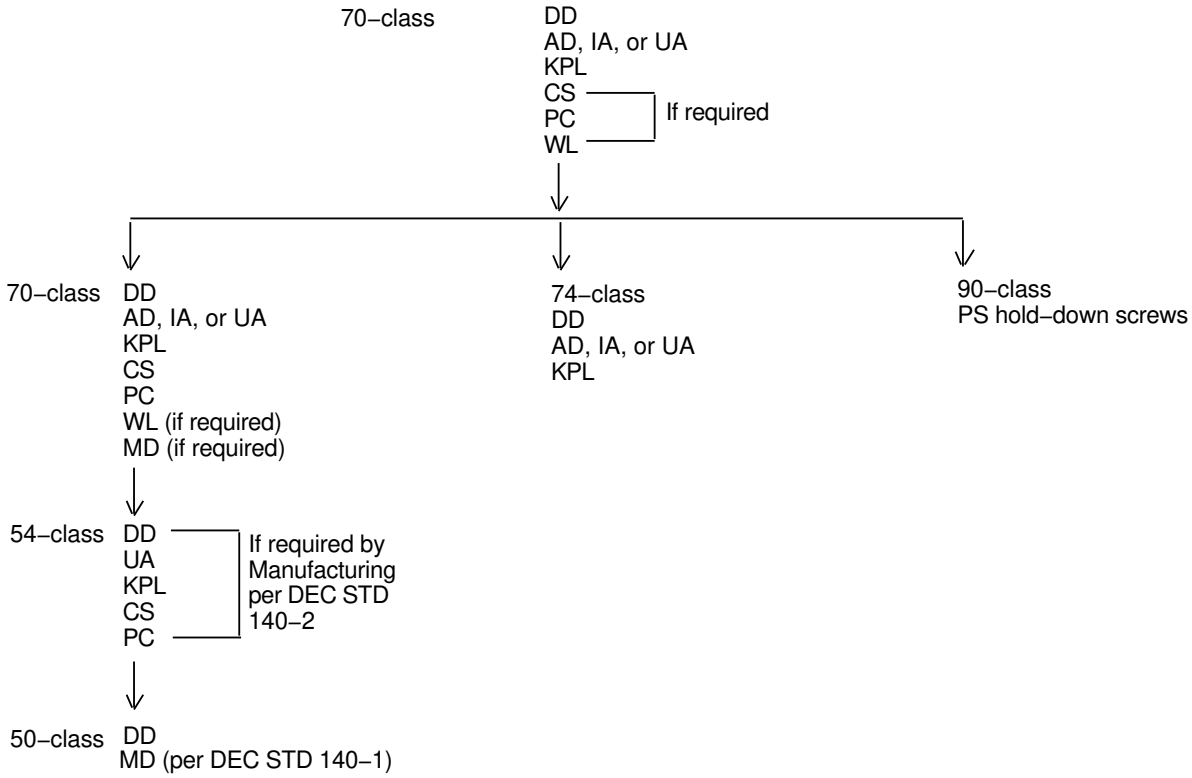
Table 2 (Cont.): Printed-Wiring Board Backplane (Single Board) Documentation

	OD[1]
50-class	DD[2]
	MD (if required)[2]

[1]See DEC STD 140-2

[2]See *DEC STD 140-1 Documentation Requirements for Printed-Wiring Boards (50-Class)*

Figure 1: Multi-Assembly Backplane Documentation



6.1.1 Drawing Directory

The DRB-126C format Drawing Directory (DD), defined in *DEC STD 024-1 Top Document Requirements - DRB 126C Format*, is the top document for the backplane documentation package. It is used as an index to the product documentation package. The Wire Table (WT) Revision Status sheet was used for this purpose prior to 1982.

Any existing backplane documentation packages that do not include a DD will be updated to meet this requirement as part of the next backplane ECO. The revision of the DD will start at the next revision level above the WT it replaces.

The DD will replace (and make obsolete) the WT Revision Status sheet. However, it will not include a list of the applicable revisions of soft tooling. The DD will only be used to identify and list the applicable data base revision. Manufacturing soft tooling documentation will be used to track the relationship between hardware revisions, data base revisions, and the soft-tooling revisions.

For backplanes, the DD should be arranged to show the documentation in distinct groups that correspond to the levels denoted in Table 1, Table 2, and Figure 1. The DD is easier to understand if drawings that relate to the complete backplane assembly are kept separate from drawings that relate only to the PWB or subassemblies. The requirements for each group of drawings are described in subhead 6.1.2 to subhead 6.1.4.

Additional DDs may be used for multi-assembly backplanes when use of this directory will simplify or clarify the hierarchy of the documents and revisions. Refer to the multi-assembly backplane example in Figure 1. When additional DDs are used, only the DD will be referenced on the next higher-level directory.

6.1.2 Top Assembly Level Drawings

The top assembly level of any backplane assembly requires the following documents, where it is applicable to the specific backplane type:

a. Drawing Directory (DD)

b. Assembly Drawing (AD)
or
Inseparable Assembly drawing (IA)
or
Unit Assembly drawing (UA)

c. Parts List (PL)

d. Circuit Schematic drawing (CS)

e. Printed Circuit data base (PC)

6.1.2.1 Top Assembly Drawing (AD, IA, or UA)

This drawing defines in detail the complete end-item requirements for the assembled configuration of the pieces, parts, and subordinate subassemblies that, when assembled, form the backplane.

The mnemonic AD (for Assembly Drawing) is assigned if the parts and subassemblies are designed so that the end item can be disassembled as part of its normal maintenance.

The mnemonic IA (for Inseparable Assembly) is assigned if the parts and subassemblies are not designed to be disassembled and are inseparable after the manufacturing process, such as wirewrapped, soldered, or welded subassemblies.

The mnemonic UA (for Unit Assembly) is assigned if the backplane assembly has discrete components and/or integrated circuits.

6.1.2.2 Parts List

Parts list (PL) information and format requirements are described in *DEC STD 025-0 Parts List*.

6.1.2.3 Circuit Schematic

The backplane circuit schematic (CS) is a mandatory drawing in the backplane documentation package only when required by the responsible engineer. CS information and format requirements are described in *DEC STD 056-0 Circuit Diagrams and Item Designations - General Requirements*.

The CS uses the same base identification number as the related DD and top assembly. If the top assembly for a single backplane is not assigned a 54-class part number, a 54-class base identification number must not be used as part of the CS document number.

6.1.2.4 PC Data Base

The PC data base (PC) is a mandatory requirement for all backplanes that have a PWB as part of their construction. Manufacturing requirements are described in DEC STD 030-7 . The identification formats of this data base are defined in *DEC STD 185-0 Documentation of Computer Media in the Engineering Documentation System*.

6.1.2.5 Wiring List

A wiring list (WL) should only be created in the event of an ECO and the inability to create an acceptable data base.

6.1.3 Intermediate Assembly Level (54-Class Assembly)

A UA shall only be created when the backplane has discrete components and/or chips. Refer to DEC STD 140-2 for 54-class backplane documentation requirements.

If a backplane assembly does not require the use of discrete components and/or chips, then the 50-class circuit board shall be called out directly on the 70-class assembly.

Intermediate levels of assembly are required for PWB backplanes for documenting design parameters and changes such as etch cuts, jumpers, wire adds, or similar requirements peculiar to each PWB.

The PC design data described in subhead 6.1.2.4 will be identified at this level and will include, when applicable, a corresponding PL, and an IA or AD assembly drawing. This level may not be required if the top assembly level can adequately define the requirements for backplanes.

6.1.4 PC Board-Level Documentation

For PC board 50-class documentation, refer to DEC STD 140-1.

6.1.5 Documentation for Backplanes Identified as a Finished Product

Backplanes are generally configured as an inseparable assembly or subassembly as part of an option or finished product and not as a finished item in themselves.

There will be cases however, when the product manager determines it a necessary part of of the product strategy to identify the backplane as a finished product to be identified in the Option/Module List as an option.

The types of backplanes and related documentation structure will be essentially the same as previously described, with the following exception: the part identifier and document identifier will be space-space class option number rather than 54- or 70- class. Refer to *DEC STD 012-0 Part Identification Standard*.

6.1.6 Consolidation of Documentation for Similar or Related Backplanes

It is possible to consolidate documentation for multi-assembly backplanes when there is more than one backplane that is part of the same product family and has subassemblies or assemblies in common.

When such a consolidation occurs, the documentation package will require a top-level DD, using the DRB-126C and DRB-107A format to define the interrelationship of the documentation. *DEC STD 024-0 Top Document Requirements* defines the requirements for these formats.

The DRB-107A format illustrates the interrelationship and commonality between each of the backplanes defined by the documentation in block diagram format.

The DRB-108 format normally associated with the DRB-107A formats is not to be used for consolidated backplanes; use the DRB-126C in its place. The remainder of the documentation is focused on the specific backplanes.

6.2 DOCUMENT REVISIONS

Document revisions shall be in accordance with *DEC STD 012-1 Documentation Identification Conventions Including Mnemonic Codes*.

6.3 HARDWARE REVISIONS

The backplane part revision shall change only when new and old revisions of the backplane assembly are not completely interchangeable or when any other details that affect a backplane's interaction with other parts or field operation are changed, such as functionality, mounting, programming, bus loading, supplied or consumed power, and safety changes. If any doubt exists, consult the responsible engineer or the Kanata manufacturing engineer supporting the product.

The backplane DD shall contain the backplane part revision as the first line entry and shall conform to DEC STD 012 requirements.

6.4 HARDWARE REVISIONS FOR BACKPLANES RELEASED PRIOR TO 1982

When a backplane part revision was initially created for an existing backplane, the part revision level was higher than its CS or WT revision level, whichever was more appropriate, since the CS or WT revision levels were used for modules (CS) or backplanes (WT) as a quasi-hardware revision indicator. At the time of ECO, the part revision must be in accordance with DEC STD 012.

6.5 DOCUMENTATION RELEASE

Backplane documentation release shall be in accordance with DEC STD 140.

6.6 REVISION CONTROL

Changes to released backplane documentation shall require an ECO in accordance with *DEC STD 100-0 Policy and Requirements for the Product Change Process*.

7 OUTLINE DRAWING

At the request of the design engineer or manufacturing site, the locations of physical features that the design engineer deems critical shall be identified as such on the UA, if space permits. Critical features that cannot be clearly identified on the MD or UA shall be defined on a separate Outline Drawing (OD) that shall be included as part of the 50-, 54-, or 70-class release package.

APPENDIX A REFERENCED DOCUMENTS

A.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00012-00	*DEC STD 012-0 Part Identification Standard*
EL-00012-01	*DEC STD 012-1 Documentation Identification Conventions Including Mnemonic Codes*
EL-00012-02	*DEC STD 012-2 Unified Numbering Code for Part Identifier Class Codes*
EL-00013-00	*DEC STD 013-0 Standard Engineering Drawing Formats and Forms*
EL-00024-00	*DEC STD 024-0 Top Document Requirements*
EL-00024-01	*DEC STD 024-1 Top Document Requirements - DRB 126C Format*
EL-00025-00	*DEC STD 025-0 Parts Lists*
EL-00030-07	*DEC STD 030-7 Module Manufacturing Standard - Backplane Rules and Related Factors*
EL-00056-00	*DEC STD 056-0 Circuit Diagrams and Item Designations - General Requirements*
EL-00100-00	*DEC STD 100-0 Policy and Requirements for the Product Change Process*
EL-00140-00	*DEC STD 140-0 Documentation, Data, and Release Requirements for Printed-Wiring Boards, Modules, and Backplanes — Introduction*
EL-00140-01	*DEC STD 140-1 Documentation Requirements for Printed-Wiring Boards (50-Class)*
EL-00140-02	*DEC STD 140-2 Documentation Requirements for 54-Class Modules and Backplanes*
EL-00185-00	*DEC STD 185-0 Documentation of Computer Media in the Engineering Documentation System*

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